Speaking personally, I have derived inestimable benefit from meeting with and hearing here the clinical side of the subject. Those responsible for the management of this section of the Royal Society of Medicine have realized this, and in having elected this year a president who is a laboratory person they have shown that they see the value of the *entente* I have alluded to; and I can only trust that my year of office may not be detrimental to those who form the larger contingent in the Neurological Section—namely, those who pursue more specially the study of disease by the bedside.

INCIDENCE AND TREATMENT OF ENTAMOEBA HISTOLYTICA INFECTION AT WALTON HOSPITAL.

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(Report to the Medical Research Committee.)

SINCE the beginning of March, 1916, I have made a number of protozoological examinations of the stools of military patients in the New Zealand 2nd General Hospital, Walton-on-Thames. These examinations were made, in the first place, in order to detect carriers of *Entamoeba histolytica*. Detected carriers were then, whenever possible, treated; and during and after treatment I examined their stools at frequent intervals in order to ascertain the results. All the results so obtained, as far as they have any interest, are embodied in this report. It deals with the first 200 men examined at Walton, and five others sent there for treatment—205 cases in all. Upon these I have made more than 800 examinations.

Although I alone have been responsible for the examinations, on which the results here recorded are based, the investigation was only made possible by the cordial co-operation of the hospital staff. To Lieutenant-Colonel Myers, N.Z.A.M.C., now A.D.M.S. to the New Zealand Expeditionary Force, and to Lieutenant-Colonel Mill, N.Z.A.M.C., his successor in command at the Walton Hospital, I am indebted for permission to publish the results, and for the helpful interest they have taken in the work throughout. To Lieutenant Matthews, N.Z.A.M.C., who was directly in charge of the treatment of the cases, I owe the clinical details which he has kindly allowed me to include. The co-operation of Miss F. M. Durham, while acting as assistant pathologist to the hospital, alone made it possible for me to make the examinations at a distance. Miss Durham also most kindly undertook to extract from case sheets, and by personal questioning of patients, such details of clinical history as I am able to give. The work of examining the specimens has all been done at the Wellcome Bureau of Scientific Research. To Dr. A. C. Stevenson and other members of the staff I owe my best thanks for their hospitality and for much kind assistance in various ways. The investigation has been carried on by aid of a grant from the Medical Research Committee. Dr. H. H. Dale, of their staff, suggested the trial of emetine bismuthous iodide (Du Mez), of which the successful results are here recorded, and has shown constant interest in this phase of the investigation. To all I gratefully acknowledge my obligations.

The Protozoological Findings.

Examination of the stools of patients at Walton has given the following results:

Number of men infected with —		
<i>Entamoeba histolytica</i> ...	22	11%
<i>Entamoeba coli</i> ...	84	40.9%
<i>Giardia</i> (= <i>Lamblia</i>) <i>intestinalis</i> ...	40	19.5%
<i>Chilomastix</i> (= <i>Tetramitus</i>) <i>nasalis</i> ...	16	7.8%
<i>Trichomonas hominis</i> ...	5	2.4%
<i>Isospora</i> sp. ...	1	0.48%

It must be explained that the number of cases at Walton infected with *E. histolytica* has been much higher than that given above, because for some time past carriers have been sent there for treatment. These men, of whom there have been altogether about a dozen, were detected as carriers in another series of examinations undertaken by

Dr. A. C. Stevenson and myself. Their inclusion in the present series would therefore give a disproportionate value for the percentage of infection with *E. histolytica*. But as 5 of these imported cases have now been treated—forming part of the series of treatments here recorded—I have included them as supernumeraries, and left them out of account in calculating the percentage of men infected with *E. histolytica*. There are thus 27 cases (22 belonging to Walton, with 5 supernumeraries) of *E. histolytica* infection dealt with in this report. The 22 cases were found in the routine examinations of 200 men, and the percentage infected is therefore 11. In considering the infections with other protozoa, however, I have included the infections found in the 5 supernumeraries; so that these infections are calculated from 205 men.

It should be emphasized that the figures given denote the minimal number of men infected. It is not possible to be certain that a man does not harbour any given protozoon unless he has been examined repeatedly. One or two examinations are not sufficient. It is not only possible, but even probable, that of the 178 men here included as uninfected with *E. histolytica*, some at least are really infected, for 29 of these have been examined only once, and 65 only twice. The rest have been examined three or more times. If it had been possible to examine all these cases many times, it is almost certain that all the percentages would have been much higher.

Incidence of Infection with *E. histolytica* in Men of Different Classes.

All the men examined are New Zealanders who had served, as far as I can ascertain, in Egypt and Gallipoli before coming to England. They have thus all passed from a non-endemic into an endemic, and back again into a non-endemic centre of amoebic dysentery. I have therefore examined whenever possible not only those who entered Walton for dysentery, but also those entering for gunshot wounds and other complaints, since all appear to have been similarly exposed to infection with *E. histolytica*.

Of the 200 Walton men examined, 130 entered hospital for dysentery, enteric, or other intestinal ailments, or for debility following these; whereas 70 were in hospital for wounds or complaints other than intestinal. Of the 22 men infected with *E. histolytica*, 11 belong to the first category, and 11 to the second. Among the intestinal cases 90 entered for dysentery (or debility following) or persistent diarrhoea. Of these, 9 were found infected with *E. histolytica*. There were thus 13 infections among the 110 non-dysenteric patients (including among these many cases of intestinal disorder). These facts may be better appreciated as percentages, as follows:

Percentages of Cases Infected with <i>E. histolytica</i> .			
Intestinal cases ...	...	...	8.2 per cent.
Dysenteric cases ...	...	...	10.0 "
Non-dysenteric cases ...	...	...	11.8 "
Non-intestinal cases ...	...	...	15.7 "

The facts speak for themselves. They clearly show the importance of examining all men, not merely the dysenterics or suspected dysenterics, returning to England from a centre of amoebic infection. Obviously the number of men examined has been small, but it can hardly be regarded as insignificant. On the other hand, exact significance cannot be attached to the percentages, as the probable error in these is large.

I have ascertained that most of the men infected with *E. histolytica* (27 cases) have histories of dysentery, or acute diarrhoea, contracted at some time during their sojourn in the Mediterranean area. At least 2, however, and probably 4, have no such history, and have therefore been regarded as contact carriers—not convalescent carriers like the others. Reliable information on this subject is almost impossible to obtain in many cases, the testimony of the men themselves being all there is to go upon. With this reservation the character of the infection in the 27 cases studied may be stated as follows:

Ordinary convalescent carriers ...	22 cases
Contact carriers ...	4 "
Acute dysentery ...	1 case

All these cases were treated at Walton except one (No. 11), who was sent elsewhere to be treated for syphilis, and whom I have been unable to follow. Case No. 11 received special treatments which will be noted separately later.

The remaining 25 cases constitute the main series upon which the treatments now to be described were carried out.

FIRST SERIES.

Emetine Hydrochloride Hypodermically.

In this series I include all those cases which were originally treated with emetine hydrochloride hypodermically. Each man received 11 to 14 grains of emetine in daily doses of one grain. In some instances the injections were given on consecutive days; in others they were given every day for a week, and then every other day until the full amount had been administered. In several cases which received 13 or 14 grains, two, and in 2 cases more than two, days elapsed between the final injections. In all cases, however, with one exception, not less than 12 grains in all were given.

I examined the stools of all the patients every few days, both during and after treatment, for as long a period as possible. By doing so I found that out of 21 patients treated with emetine hydrochloride no fewer than 14 (that is, two-thirds) had not been cured of their infection. The remaining 7 cases were discharged as cured on the evidence summarized in the following table.

TABLE I.

Case No.	Treatment with Emetine Hydrochloride.			Consecutive Negative Examinations.	
	Begun.	Ended.	Total Quantity Given.	Dates (1916).	Total No.
V	Apr. 1	Apr. 15	12 grains	Apr. 6, 10, 18, 19, 24, 28; May 1	7
VI	Mar. 26	Apr. 7	12 ..	Apr. 3, 6, 10, 24; May 2	5
VII	Apr. 8	May 2	13 ..	May 3, 8, 14, 26	4
IX	Mar. 20	Apr. 3	12 ..	Apr. 1, 3, 4, 5, 6, 7, 10, 12, 24, 26	10
X	May 15	May 26	12 ..	May 18, 23, 25; June 13, 19	5
XV	May 21	May 31	11 ..	May 25; June 1, 8, 21	4
XVII	Apr. 1	Apr. 15	12 ..	Apr. 4, 10, 17, 18, 24, 28	6

Of the 14 cases which were not cured by emetine hydrochloride, 5 showed no improvement whatsoever. These were Cases VIII, XI, XIII, XVIII, XIX, all of which were found to be passing cysts of *E. histolytica* every time they were examined both during and after treatment.

The other 9 uncured cases passed no cysts or amoebae (that is, were negative) for some time during or immediately after treatment. They then relapsed (that is, were found to be positive—passing cysts or amoebae) at varying intervals of time after treatment. The facts about these 9 cases are given in the following table.

TABLE II.

Case No.	Treatment with Emetine Hydrochloride.			Consecutive Negative Examinations.		First Positive Examination after Treatment.
	Begun.	Ended.	Total Quantity Given.	Dates (1916).	Total No.	
I	Apr. 9	Apr. 30	14 gr.	Apr. 14, 18, 24	3	May 1
IV	Apr. 27	May 8	12 ..	May 1, 8	2	May 11
XII	Apr. 13	May 5	14 ..	Apr. 14, 18, 19, 24, 26	5	May 8
XIV	Apr. 2	Apr. 27	14 ..	Apr. 10, 11, 14, 15, 18, 24	6	May 1
XVI	Apr. 27	May 8	12 ..	May 8, 11, 14	3	May 24
XX	May 30	June 10	12 ..	June 4, 12, 19	3	June 26
XXI	June 13	June 24	12 ..	July 3	1	July 7
XXII	July 5	July 16	12 ..	July 17	1	July 20
XXIII	July 5	July 16	12 ..	July 10, 17	2	July 20

The facts given in Table II clearly show that negative examinations made during and immediately after treatment cannot be relied upon as an indication that a cure has been effected. Nine out of the 14 uncured cases were found negative at this period, the number of negative examinations made on the individuals ranging from one to six. On a system, which requires only three consecutive

negative examinations to establish a "cure," at least 5 of the infected cases—and probably more, if the examinations had been made more often—could have been discharged.

It will be seen from Table II that the time which elapsed between the end of treatment and the date when a relapse was found to have occurred differs in different cases. These times may be summed up as follows:

Case I	had relapsed on the 1st day after treatment.
Case IV	" " 3rd " "
Case XII	" " 3rd " "
Case XIV	" " 4th " "
Case XVI	" " 16th " "
Case XX	" " 16th " "
Case XXI	" " 13th " "
Case XXII	" " 4th " "
Case XXIII	" " 4th " "

Such facts as the above will have to be taken into account when considering the times when negative examinations are of value for the establishment of a "cure."

The first series of treatments with emetine hydrochloride subcutaneously may now be conveniently summarized.

Altogether, twenty-one men infected with *E. histolytica* were treated. Of these, fourteen were not cured of their infection after a course of 12 to 14 grains of emetine. The other seven were discharged as cured after having 11 to 13 grains, followed by four to ten negative examinations extending over a period of at least two to three weeks after treatment.

Whether all the seven "cured" cases are really freed from infection or not remains, I think, open to doubt. It is quite possible that some of them at least might have relapsed if they had been examined for a longer time. Circumstances, however, have not permitted this. But on the other hand, what is quite certain, and open to no doubt at all, is that 66.6 per cent. of the cases treated with emetine hydrochloride were definitely not cured. This percentage relates to 14 cases made up as follows:

Convalescent carriers	...	...	11 cases
Contact carriers	...	...	2 "
Acute dysentery	...	...	1 case

SECOND SERIES.

Emetine Bismuth Iodide.

It was now decided to try whether emetine bismuth iodide would succeed where emetine hydrochloride had failed. The results obtained about this time at the Chichester Military Hospital seemed sufficiently promising to justify hopes of success.¹ Through the kindness of Dr. H. H. Dale, F.R.S., a sufficient quantity of the double iodide was supplied to Walton Hospital by the Medical Research Committee; and thanks to the collaboration of the medical officers at the hospital, a second series of trial treatments was now begun.

For this series the 14 men unsuccessfully treated with emetine hydrochloride formed the material. Of these, 11 were treated at once with a full course of emetine bismuth iodide. The other 3 were each given a second full course (12 grains) of emetine hydrochloride hypodermically, so that they constitute a control for comparison with the cases treated with the double iodide.

The double iodide of emetine and bismuth, which is given by the mouth on a full stomach, was administered in cachets containing 1 grain each, thrice daily, until 36 grains had been taken.² Lieutenant Matthews informs me that in a few cases the daily dosage was reduced on account of the vomiting which was produced; but he adds that he has found it best to "persist with the drug in full doses, as tolerance is usually established in a couple of days. Tolerance is not established nearly so early if the dosage is reduced on account of vomiting." "On the whole the drug was well tolerated."

Most of the patients experienced more or less nausea during treatment, but with several it was slight, and in only one case was vomiting frequent and severe. (This was Case XXI, who had previously had two full courses of emetine hydrochloride. Treatment with the double iodide was begun only two days after the second hypodermic treatment, so that it seems not improbable that the severe effects produced were due to emetine poisoning.) All the cases suffered more or less from diarrhoea during treatment, one case (No. XIII) having as many as fourteen to sixteen motions daily. In all cases, however, the diarrhoea

seems to have disappeared after treatment. This effect of the drug is probably beneficial, as the constant emptying of the colon would serve to remove amoebae—both dead and alive—and prevent the accumulation of faecal matter in healing ulcers.

The results of treatment with emetine bismuth iodide far surpassed the most sanguine expectations. Of the 11 men so treated, every one became negative (that is, ceased to pass cysts or amoebae) within a few days of beginning treatment, and all remained negative for as long as I was able to continue examining them. In some cases the examinations have been numerous, and have extended over a considerable period. The results are summarized in Table III:

TABLE III.

Case No.	Treatment with Emetine Bismuth Iodide.			Consecutive Negative Examinations.	
	Begun.	Ended.	Total Quantity Given.	Dates (1916).	Total No.
I	June 27	July 8	36 gr.	June 29; July 4, 7, 12, 17, 20, 25, 27, 31	9
IV	June 27	July 8	36 gr.	June 29; July 3, 7, 10, 12, 17, 20, 23, 27, 31	10
XI	June 28	July 9	36 gr.	July 4, 10, 12, 17	4
XII	June 27	July 8	36 gr.	June 29; July 3, 7, 11, 13, 17, 20, 26; Aug. 9	9
XIII	June 27	July 8	36 gr.	July 3, 7, 10, 12, 17, 20; Aug. 8, 17, 28	9
XIV	June 28	July 9	36 gr.	June 29; July 5, 10, 12, 17, 20, 25, 27, 31	9
XVI	July 8	July 20	36 gr.	July 12, 17, 20, 25; Aug. 2, 7, 11, 15, 17, 23, 25, 29	12
XVIII	June 27	July 8	36 gr.	July 3, 7, 10, 12, 17, 20, 23, 27; Aug. 1	9
XIX	July 24	Aug. 4	36 gr.	July 28; Aug. 1, 4, 8, 11, 15, 17	7
XXII	July 25	Aug. 6	36 gr.	July 27, 31; Aug. 4, 7, 11, 15	6
XXIII	July 25	Aug. 6	36 gr.	July 27, 31; Aug. 4, 7, 11, 15	6

Case XI is the least satisfactory of those given in this table, for he had only four negative examinations, and was last examined on the eighth day after treatment. It is therefore uncertain whether he is really cured. (He is a wounded man discharged from the army. I have not yet succeeded in following him up.) Cases XIX, XXII, and XXIII are also, perhaps, somewhat doubtful; for although they have each had six or seven negative examinations, these cover rather less than a fortnight of the period immediately following treatment. (These cases were then discharged as cured and I was unable to continue examining them.) It may be recalled, however, that Cases XI and XIX had previously remained positive throughout the whole period of their treatment with emetine hydrochloride; whereas Cases XXII and XXIII had become negative for a very brief period, and had then both relapsed four days after treatment ended. The results of treatment of these four cases with the double iodide are therefore, though not conclusive, at all events extremely promising, and very much better than those obtained earlier with emetine hydrochloride.

For the other seven cases treated with the double iodide—namely, Cases I, IV, XII, XIII, XIV, XVI, XVIII—something more than a promising result can, I think, be fairly claimed. Each of these has had a long run of consecutive negative examinations extending over a period of more than three weeks since the end of treatment. The two cases which I have been able to follow for the longest time*—namely, Nos. XIII and XVI—have now remained negative for fifty-one and forty days respectively since they had their last dose of double iodide, or for eight weeks and seven weeks respectively if the period during treatment is taken into account. It may, I think, be reasonably assumed that all these seven men are now no longer infected with *Entamoeba histolytica*.

I would add that all the cases were examined very thoroughly before being pronounced negative—far more carefully and for a much longer time than is possible in an ordinary routine examination. I expected that some at least would relapse, and therefore could not easily convince myself that I was mistaken.

* The last three examinations were made on Case XIII after he had left Walton. I was able to make two of these myself through the courtesy of Captain C. Banks, R.A.M.C., whilst for the third I am indebted to Mr. W. O. Redman King, who kindly made it for me.

THE CONTROL SERIES.

Re-treated with Emetine Hydrochloride.

It has already been noted that 3 of the 14 cases which failed to get cured in the first series of treatments (emetine hydrochloride) were not given the double iodide at the same time as the 11 men just considered. These three men (Nos. VIII, XX, XXI) were given a second full course each of emetine hydrochloride hypodermically (1 grain daily for twelve consecutive days). The results of this second treatment were as follows: Nos. XX and XXI, who had both become negative for a short time during their first treatments, now showed no improvement whatsoever during their second courses. Both were found to be passing cysts every time they were examined during and after treatment. Case VIII, who had previously remained positive throughout his first course, ceased to pass cysts three days after his second treatment had begun; but later, after remaining negative for some time, he relapsed. His record is shown in the following table:

TABLE IV.

Case No.	Treatment with Emetine Hydrochloride (2nd Course).			Consecutive Negative Examinations.		First Positive Examination after Treatment.
	Begun.	Ended.	Total Quantity Given.	Dates (1916).	Total No.	
VIII	June 27	July 8	12 gr.	June 29; July 3, 7, 10, 14, 17	6	July 20

It will be evident from Table IV that a relapse was detected twelve days after treatment had ended. This case is again instructive from the point of view of negative examinations, and the number of them necessary to establish a "cure."

The results of the second series of treatments may now be summarized. Of fourteen men—all of whom had previously been treated hypodermically with emetine hydrochloride—eleven were treated with emetine bismuth iodide per os; whilst the other three received a second full course of the hydrochloride. The men of the first lot (double iodide) are all, more or less certainly, cured; those of the second lot (hydrochloride) were certainly none of them cured.

THIRD SERIES.

Treatment of the Uncured Controls with Double Iodide.

Since the treatment with emetine bismuth iodide appeared to have brought about a cure in every case in which emetine hydrochloride had previously failed; and since the three cases (controls) treated with a second course of emetine hydrochloride had again none of them been cured: it only remained, as a final test of the efficacy of the double iodide, to treat these three still uncured cases with it and to ascertain the results. Unfortunately, one of these three cases (No. VIII) was sent away from Walton before he could be treated; but the other two remained, and were treated at once with the double iodide. I have fortunately been able to examine them both for a considerable time. Their stories are summarized in the following table:

TABLE V.

Case No.	Treatment with Emetine Bismuth Iodide.			Consecutive Negative Examinations.	
	Begun.	Ended.	Total Quantity Given.	Dates (1916).	Total No.
XX	July 25	Aug. 5	36 gr.	July 28; Aug. 1, 4, 7, 11, 15, 16, 18, 21, 22, 23, 24, 25, 28, 29, 30	16
XXI	July 21	Aug. 4	36 gr.	July 25, 27, 31; Aug. 4, 9, 15, 17, 18, 21, 22, 23, 25, 28, 29, 30	15

From the evidence given in this table it appears almost certain that both these men are now no longer infected with *E. histolytica*. In other words, both the cases which two full courses of emetine hydrochloride completely failed to cure, have now been cured by a single course of the double iodide.

FOURTH SERIES.

Fresh Cases Treated with Emetine Bismuth Iodide Only.

After such successful results had been obtained with the double iodide treatment, no further cases were treated with emetine hydrochloride at Walton. As fresh carriers of *E. histolytica* were detected, they were at once treated with the double iodide—in every case with success, so far as could be judged. Circumstances have prevented me from making a protracted series of examinations of these cases after treatment; but I have particulars now of four of them which are worthy of record. They are given in the following table:

TABLE VI.

Case No.	Treatment with Emetine Bismuth Iodide.			Consecutive Negative Examinations.	
	Begun.	Ended.	Total Quantity Given.	Dates (1916).	Total No.
XXIV	July 11	July 24	36 grains	July 13, 17, 21, 23, 27; Aug. 1	6
XXV	July 22	Aug. 2	36 ..	July 28; Aug. 1, 4, 8, 11, 15	6
XXVI	Aug. 4	Aug. 15	36 ..	Aug. 5, 7, 11, 14, 15, 16, 28, 29, 31	9
XXVII	July 31	Aug. 10	36 ..	Aug. 3, 11, 17, 24	4

Although these treatments appear to have been successful, it will be seen that the longest period after treatment during which any case was followed was only sixteen days (Case xxvi). Nevertheless, as all the other cases which I have been able to follow, after treatment with the double iodide, have consistently remained negative to the last, there are, perhaps, reasonable grounds for regarding these four additional cases as cured and for justifying their discharge, which has now taken place. It may be added that two of the above cases (xxv and xxvi) had never been treated previously with emetine in any form, while the other two (xxiv and xxvii) appear to have had emetine injections about a year previously whilst suffering from dysentery in the Mediterranean area. They were all supposed to be cured and healthy men (except xxvi, who was in hospital for wounds) until I found they were passing cysts of *E. histolytica*.

Additional Notes on the Cases Treated with Emetine Bismuth Iodide.

Several of the cases described in this report present features of interest which have not yet been mentioned. These will now be dealt with as briefly as possible.

CASE I.—This man has already figured in the tables as one of those not cured with emetine hydrochloride (Table II) and subsequently cured with the double iodide (Table III). Between these two courses he was treated for syphilis, receiving mercury (liq. hydrarg. perchlor. 1½ drachms daily) from May 6th to June 27th. I examined him several times during and repeatedly after this mercury treatment, and so ascertained that it had had no effect upon any of the protozoa with which he was infected (*Entamoeba histolytica*, *E. coli*, and *Lambliæ*). These findings seem worthy of record. I have regarded this case as a contact carrier. He entered hospital for gunshot wounds, has no official history of dysentery or previous emetine treatment, and denies that he has ever had any dysenteric symptoms or even acute diarrhoea.

CASE III.—Has not figured in any of the tables. I have not included him in the general series of treatments, because he has been treated in so many ways that it is impossible to ascribe his cure to any one treatment. Before going to Walton he had suffered from dysentery, and been treated repeatedly with emetine injections; but was still passing cysts of *E. histolytica* when I first examined him. His treatments at Walton include more emetine hydrochloride (without success); rectal injections of quinine and tannin; appendicostomy, followed by irrigations of the large intestine; and finally emetine bismuth iodide *per os*. He has now had a long series of negative examinations, and appears to be completely cured; but how far each treatment has been responsible for this happy result can never be decided.

CASE IV is the only case of acute dysentery in the series. His treatments have already been given in the tables (II and III). He belonged to the Maori Contingent, and contracted dysentery in Gallipoli. At Walton subsequently (although he did not enter for this) he was found to be suffering from a persistent acute, or subacute, infection with *E. histolytica*. He had six to nine motions daily, often containing blood and large numbers of amoebae. When his condition was detected he was treated with a full course of emetine hydrochloride hypodermically (Table II), this being the first emetine treatment he had ever

had. After receiving 12 grains (one daily for twelve successive days) he was found to be passing blood and amoebae again three days after treatment. One often hears that emetine "acts like a charm" in acute amoebic dysentery. In this case it appears to have acted as charms too often act. It certainly did not act like a specific drug.

After this first emetine treatment, the man's condition was no better than before. He continued to have many motions a day—often containing blood, mucus, and amoebae—and complained of severe abdominal pain, for which he was given morphine suppositories (½ grain) once or twice daily. Before beginning treatment with the double iodide (Table III) he had been in this chronic dysenteric state for five or six months. He was very ill and depressed, and expected to die. During his double iodide treatment he was strictly dieted. He vomited during the first two days. His stools were not examined on the first day; but on the second I found that all amoebae had disappeared, and no amoebae or cysts have since been found. After treatment, he gradually returned to ordinary diet. His faeces became normal and formed, and he had only one (or two) motions daily. Clinically, he has made a wonderful recovery, and is now quite well and healthy.

This case is of great interest, for it not only demonstrates the great superiority of the double iodide of emetine over the hydrochloride in a particular instance of acute dysentery, but it shows also that there are acute cases which are practically incurable with hypodermic treatment, but which can, nevertheless, be quickly cured with the double iodide.

CASES VII, XVI, and XXIV had suffered from dysentery and been treated with emetine hypodermically before going to Walton. No. XVI is especially interesting because, after his earlier treatments, he had twice previously been discharged from hospital as cured and not a carrier. In addition to emetine, he had also had rectal injections of silver nitrate and morphine; also salol and paraffin. At Walton, however, he was found to be passing large numbers of cysts of *E. histolytica*. (His treatments are given in Tables II and III.)

CASES XII, XIII, XV, XVIII, XXV, XXVI, had all suffered at some time from dysentery; but none of them had been treated with emetine before going to Walton, and some have no record of dysentery in their papers. Case XVIII is specially interesting in this connexion. He has no official history of dysentery, but his real history is that of a common type of convalescent carrier.

CASES V, X, XI, XXII, XXIII, have no history of dysentery, and had never previously had emetine injections. On being questioned, they all said they had suffered more or less from diarrhoea—which was not treated—in Gallipoli. None of them except No. x (enteric convalescent) entered Walton for intestinal disorders.

Information concerning the remaining cases is too meagre or commonplace to be worth recording.

The obvious suggestion is often made that those cases which fail to get cured with hypodermic emetine treatment are those which have previously been treated, and whose amoebae have consequently become resistant to emetine. It will be seen from the foregoing notes, however, that in the cases here considered there is no appreciable difference—in the behaviour towards emetine—between those treated and those untreated previously; and all have behaved in precisely the same way towards emetine given as the double iodide.

Emetine Bismuth Iodide a Specific for *Entamoeba histolytica*.

The effects of the administration of the double iodide upon the protozoal content of the stools—which are the effects that have especially come under my own observation—are truly remarkable. Within four days of the commencement of treatment all stages of *Entamoeba histolytica*, whether amoebae or cysts, have completely vanished from the faeces, and in no single instance have they been subsequently found. When it is remembered that some of the cases had been found to be passing cysts in large numbers almost every time they had been examined previously—for weeks, and in some cases for months—it will cause no surprise when I say that the results of the double iodide treatment have appeared to me astounding.

Many of the men treated with the double iodide were infected with *Entamoeba coli*, *Lambliæ*, and *Chilomastix*, and in no case has the treatment removed any of these protozoa. As a rule *E. coli* disappears from the faeces during treatment, but it almost invariably reappears afterwards. *Lambliæ* and *Chilomastix* are quite unaffected by the double iodide, though the diarrhoea produced by the drug often causes the appearance of the free flagellates, in addition to the cysts, of these forms in the faeces.

It seems, therefore, that in emetine bismuth iodide we have a specific drug which, whilst unpleasant to the patient, is very deadly to *E. histolytica*, but harmless to the other protozoa of the human bowel.

In conclusion, I add a summary in tabular form of all the cases whose treatment has been described in this report. It will show at a glance, I think, not only all the results obtained, but also the great success achieved in the treatment of *E. histolytica* infections with emetine bismuth iodide at Walton Hospital.

Summary of Treatments.

It should be noted in the above table "discharged as cured" cannot be regarded as synonymous with "certainly cured." The hospital authorities found it necessary to discharge some of the patients as early as seven or eight days after treatment was finished; whereas I have recorded above cases in which relapse (reappearance of cysts) occurred as late as sixteen days after conclusion of treatment. The shortest negative period after the end of treatment which can safely be regarded as indicating a "certain" cure can therefore be hardly less than about three weeks.

Taking twenty-one days as such an arbitrary limit, and describing cases which have remained negative for this interval or longer after treatment as "certain" cures, we may rearrange the above results as follows:

	Treated with Emetine Hydrochloride.	Treated with Emetine Bismuth Iodide.
Total number of treatments	24	17
Number of "certain" cures	5	9
Number of uncertain cures	2	8
Number of relapses	17	0

REFERENCES.

¹ See Dale, Treatment of Carriers of Amoebic Dysentery, etc., *Lancet*, July 29th, 1916. ² Cf. Dale, loc. cit.; Low and Dobell, Three Cases of *Entamoeba histolytica* Infection treated with Emetine Bismuth Iodide, *Lancet*, August 19th, 1916.

NOTE ON

SOME EXAMINATIONS AND TREATMENTS FOR ENTAMOEBA HISTOLYTICA INFECTIONS.

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(Report to the Medical Research Committee.)

THE examinations here reported were conducted at the Central Laboratory of the Eastern Command, at the Kitchener Hospital, Brighton, and extended over a period from February to August, 1916. The men examined were 426 intestinal cases invalided home from the Mediterranean Expeditionary Force in October–November, 1915, who had been treated in various ways at other hospitals before coming to Brighton. The clinical diagnosis was given for 357 of them; of these, 153 were dysenterics and 204 non-dysenterics.

The three commonest human intestinal protozoa were found as follows:

<i>Entamoeba coli</i> :			
Alone	...	...	76 cases
With <i>E. histolytica</i>	...	...	10 "
With <i>Lambli</i> <i>intestinalis</i>	...	...	16 "
With <i>E. histolytica</i> and <i>L. intestinalis</i>	...	...	8 "

110 cases

= 25.8 per cent. total cases.

Lambli *intestinalis*:

Alone	...	...	53 cases
With <i>E. coli</i>	...	...	16 "
With <i>E. histolytica</i>	...	...	4 "
With <i>E. coli</i> and <i>E. histolytica</i>	...	...	8 "

81 cases

= 19 per cent. total cases.

Entamoeba histolytica:

Alone	...	...	11 cases
With <i>E. coli</i>	...	...	10 "
With <i>L. intestinalis</i>	...	...	4 "
With <i>E. coli</i> and <i>L. intestinalis</i>	...	...	8 "

33 cases

= 7.75 per cent. total cases.

These numbers are certainly lower than the actual infections. Although some 1,850 examinations were made on the 426 cases—that is, an average of over four per case—only 280 cases actually had as many as three examinations each, and it is daily becoming more evident that a small number of examinations will not detect these protozoal infections in every case.

The *E. histolytica* Carriers.

No acute case of dysentery was examined during this period. The carriers were found both among men diagnosed clinically as dysenterics and those invalided for other intestinal disorders; but a considerably larger proportion of the former were found to be infected with *E. histolytica*. The carriers were treated with hypodermic injections of emetine hydrochloride—10 to 12 gr. being considered a full course, given in single daily injections of 1 gr. each—and examined every two or three days during treatment, and for as long as possible afterwards. When possible they were only discharged as cured when examinations for three weeks from the end of treatment had been negative. It is not worth while considering more than twenty-three of the cases in detail, owing to lack of data concerning the others; this will include all those satisfactory from this point of view. Of these, twenty men at the Kitchener Hospital and one officer at the Howard Home, Brighton (No. 15),¹ had full courses of emetine as defined above, and nine of these were discharged as cured on the observations given in Table I.

TABLE I.

Case No.	Treatment.			Consecutive Negative Examinations.	
	Begun.	Ended.	Amount Given.	Dates, 1916.	No.
15	May 21	June 1	12 gr.	June 2, 9, 17 (relapsed June 21)	3
	July 6	July 15	10 gr.	July 15, 24, 27, 29, 31	5
18	Aug. 5	Aug. 17	12 gr.	Aug. 10, 16, 19, 23, 25, 28, 30; Sept. 1, 4, 6, 8, 11	12
19	Aug. 5	Aug. 16	12 gr.	Aug. 14, 15, 18, 20, 23, 25, 28, 30; Sept. 1, 4, 6, 8	12
29	Aug. 9	Aug. 20	12 gr.	Aug. 16, 23, 25, 28; Sept. 1, 4, 6, 8	8
31	July 24	Aug. 2	10 gr.	Aug. 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28	11
35	Aug. 5	Aug. 16	12 gr.	Aug. 16, 18, 20, 22, 24, 26, 29, 31; Sept. 2, 5, 7	11
36	Aug. 9	Aug. 25	14 gr.	Aug. 29, 31; Sept. 2, 7, 9, 12, 14, 16, 19, 21	10
37	July 24	Aug. 2	10 gr.	July 31; Aug. 7, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 29, 31	14

* I have cast these results in tables of the same form as those given by Dobell, in order to facilitate comparison.

One other case (No. 14) had been negative for a month after two small courses before his full course of 10 grains, after which he was negative for another month before discharge. The authorities decided to discharge Nos. 15 and 29 less than three weeks after the end of their treatment. No. 15 had only been negative for a fortnight after his second course, and as his relapse was not detected until twenty days after his first course, his cure may be considered exceedingly doubtful. No. 29 was discharged nineteen days after the end of treatment.

Twelve cases relapsed before the end of the three weeks' examination after treatment, as shown in Table II.

¹ I am indebted to Major D. G. Hall, R.A.M.C., for information regarding the history and treatment of this case.